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Sedimentary Facies & Depositional Environment of Shendi Formation , AL- Musauwarat/ Umm Ali Area, Sudan.

A Thesis Submitted Fullfillment of the Requirements for the
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DEDICATION

To my parent, sisters, brothers , good friends &
any one tries to read this thesis

Abstract

Shendi-Atbara Basin is an outlier surrounded by Precambrian and Paleozoic crystalline rocks. South of Shendi, the basement is exposed at the Sabaloka inlier, and Butana plain at the east. The Shendi-Atbara Basin is now considered as an important target for hydrocarbon exploration in central Sudan. The study area is bounded by the longitude 16°23'52.30" and 17° 15' 30.30" & latitude 33°18'51.9" and 33° 43' 33.85', in eastern and western parts of River Nile State. Study area is dominated by Mesozoic sediments of continental origin from fluvial and lacustrine depositional environments which are widely spread in central Sudan. During the field work trip, fourteen vertical and three lateral sedimentary profiles have been examined and discussed. The studied profiles exhibit eleven lithofacies identified at the outcrop section which are matrix supported massive conglomerate (Gmm) facies, stratified conglomerate (Gt), trough cross-bedded sandstone facies (St), Shallow scour pebbly sandstone (Ss), planar cross-bedded sandstone facies (Sp), horizontally –bedded sandstone facies (Sh), ripple cross-bedded sandstone facies (Sr), massive sandstone facies (Sm), massive mudstone (Fm), fine-laminated mudstone (Fl) and rootbed mudstone (Fr). The study aims to the interpretation of depositional environment using lithofacies analysis. On the basis of their sedimentological character these facies are interpreted to be deposited in fluvial depositional environment, by multi braided river channels. Representative samples were subjected to various preparation methods to permit its investigation, both mechanically and microscopically. The laboratory methods include: grain size analysis, determination and calculation of statistic coefficient using Microsoft Office Excel software, drawing the sedimentary profiles using sed.log software, preparing maps using ArcGIS software for digital image processing, petrographic description, total organic carbon (TOC) analysis, heavy minerals analysis, palynological analysis & scanning electron microscope (SEM). The samples are very poor in term of TOC and hydrocarbon potential, they are barren in palynomorphs, the main cementing material is clay (Kaolinite & Chlorite) with low concentration, no significant concentration of heavy minerals is observed.

المستخلص

حوض شندي-عطبرة هو حوض حديث العمر محاط بصخور متبلرة من العمر الما قبل الكامبري ودهر الحياة القديمة ،. تتكشف صخور الأساس في معقد السلبوكة جنوب شندي ومنطقة البطانة في الشرق. يعتبر حوض شندي - عطبرة منطقة مستهدفة لاستكشاف الهيدروكربونات في وسط السودان. تقع منطقة الدراسة بين خطوط الطول $16^{\circ} 23'$ و $17^{\circ} 15' 30.30''$ ، وخطوط العرض $33^{\circ} 43' 33.85''$ و $33^{\circ} 18' 51.9''$ ، في الأجزاء الشرقية والغربية من نهر النيل . صخور منطقة الدراسة هي صخور من دهر الحياة المتوسطة ، وهي صخور قارية المنشأ ترسبت في بيئات نهريّة وبحيرية ، وهي بيئات منتشرة في أواسط السودان. تم خلال العمل الحقلّي دراسة 14 مقطع رأسي ، و3 مقاطع أفقية وتم تحديد أحد عشر سحنة صخرية وهي : سحنة الحجر الرملي ذو التطبيق المتقاطع الحوضي ، سحنة الحجر الرملي ذو التطبيق المتقاطع المستوي ، سحنة الحجر الرملي ذو الترقق الأفقي، سحنة الحجر الرملي الحصوي ، سحنة الحجر الرملي المصمت ، سحنة الحصى المصمت، سحنة الحصى ذو التطبيق المتقاطع ، سحنة الحجر الطيني المصمت، سحنة الحجر الطيني المترقق ، سحنة الحجر الطيني النيمي.

الهدف من الدراسة هو تحديد نوع بيئة الترسيب وتفسيرها وذلك باستخدام تحليل السحنات الرسوبية وقد تم تفسيرها بأنها بيئة نهريّة ترسب من خلال قنوات متعرجة متعددة. أجريت على عينات ممثلة عدة تحاليل مكتبية و معملية ميكانيكية وكيميائية ومجهريّة والتي شملت :إعداد الخرائط الجيولوجية لمواقع الدراسة باستخدام برنامج ArcGIS التحليل الحجمي للحبيبات ، وحساب المعاملات الحسابية الاحصائية باستخدام برنامج Microsoft Office Excell ، ورسم المقاطع الرسوبية باستخدام برنامج ال Sed.log Software ، دراسة الشرائح الصخرية ، وتحليل الكربونات العضوية ، وتحليل المستحاثات الدقيقة ، والمجهر الإلكتروني ، وتحليل المعادن الثقيلة ، وقد اتضح بأن العينات لا تحمل هيدروكربونات بنسب معتبرة وليست مصدراً محتملاً لها ،وأنها خالية من المستحاثات الدقيقة ، ولا تحمل نسب معتبرة من المعادن الثقيلة ، وتوجد بها معادن الطين (الكاوليناينايت والكلورايت) كمعاد لاحمة بشكل أساسي.

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